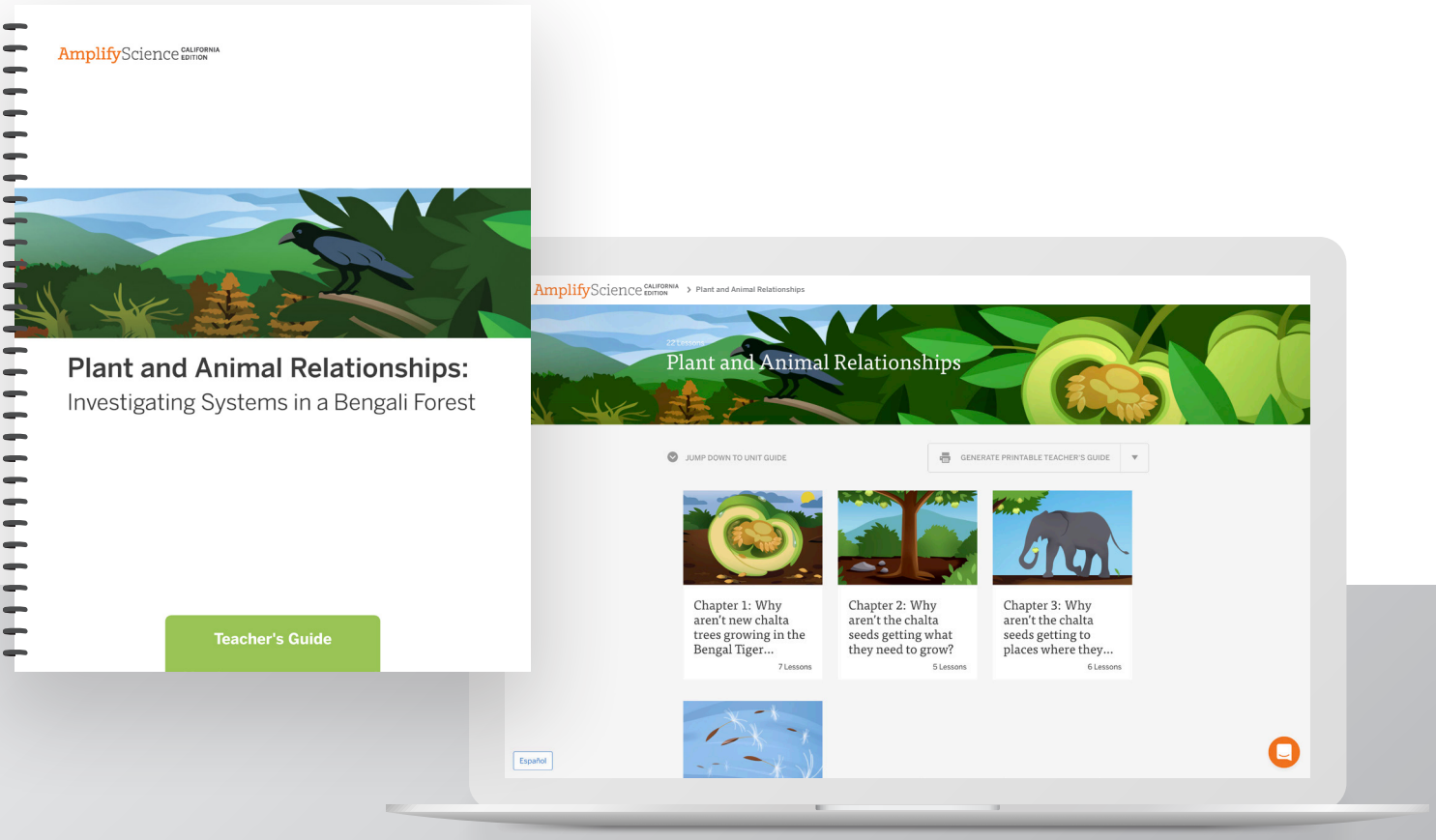
Amplify Science
CALIFORNIA

Grade 2

UNIT GUIDE

Plant and Animal Relationships



Amplify.

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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Welcome to Plant and Animal Relationships

Understanding what an animal needs to grow and how it gets what it needs are likely familiar concepts to students. In contrast, plant needs and the ways that plants depend on animals to meet those needs are more complex and likely less familiar to second graders. Amplify Science California helps students develop a deeper understanding of the interdependence that exists between plants and animals by inviting them to investigate how plants get what they need to grow along with how plants depend on their habitat to move them to new places where they can thrive.

> Unlike a typical curriculum, Amplify Science California anchors learning by inviting students to take on the role of scientists and engineers.

In this unit, students take on the role of plant scientists. Their job is to help the lead scientist at the fictional Bengal Tiger Reserve figure out why no new chalta trees are growing there. Working together, they explore the needs of plants along with the relationships that exist between plants and animals in a habitat. By the end of the unit, students explain seed dispersal and various seed-dispersal mechanisms.

Unit Type: Investigation

Student Role: Plant Scientists

Phenomenon: No new chalta trees are growing in the fictional Bengal Tiger Reserve in India.

Core Concept: Understanding the interdependence that exists between plants, animals, and their environment

Target Performance Expectations:

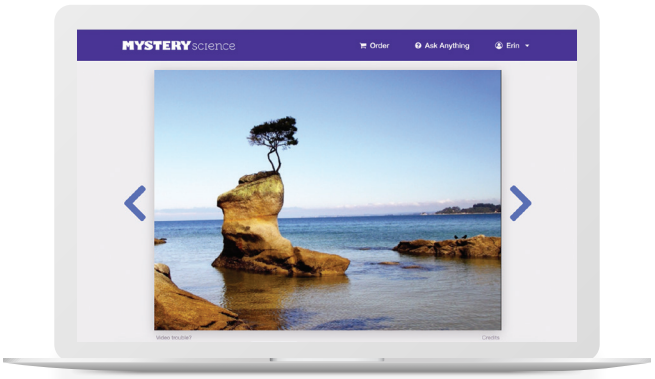
- 2-LS2-1: Sunlight and Water for Plants
- 2-LS2-2: Animals' Role in Seed Dispersal
- 2-LS4-1: Diversity of Life in Different Habitats
- K-2-ETS1-1: Defining the Problem
- K-2-ETS1-2: Developing Possible Solutions
- K-2-ETS1-3: Comparing Different Solutions

Students figure out the unit phenomenon through the use of a variety of resources.

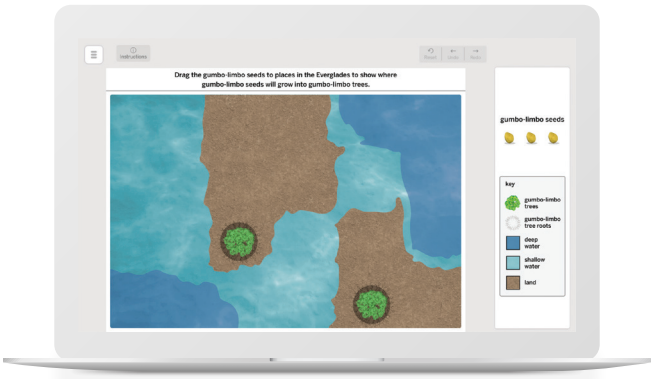
Student Books

Hands-On Kit

Videos



Practice Tools



About technology in this unit:
Amplify Science California gives you the flexibility to use technology in the way that meets your needs best. In K–2, teachers have the option of using:

- **Student digital licenses** that allow for online completion of work, teacher feedback and grading, and digital class management.
- **Traditional consumable resources** that allow for a more familiar paper and pencil experience.

Whether students use the student digital experience or print workbooks, there are some technology-based activities all students will experience from time to time.

In grade 2, technology-based activities are limited to Practice Tools. In this particular unit, only 4 of the 22 lessons incorporate the use of devices with only 5% of the unit's activities involving the use of a digital tool.

When the use of a digital tool is called for in a lesson, teachers have several implementation options:

- **If limited student devices are available,** students can do activities in pairs or small groups.
- **If no student devices are available,** teachers can project the digital tool to the class and create a whole class experience.

Chapter 1: The storyline begins

What students investigate:

Why aren't new chalta trees growing in the Bengal Tiger Reserve?

What they figure out:

The chalta trees in the Bengal Tiger Reserve make seeds. Only the seeds that get enough water and sunlight will sprout and grow into new adult plants. There are no new chalta trees because the chalta seeds must not be getting enough water and sunlight.

How they figure it out:

- Learning about some of the different habitats on Earth, the plants and animals that live in a broadleaf forest habitat, and about seeds and how new plants grow as they read the student book *Handbook of Habitats* with a partner
- Learning about how scientists study habitats as they read the student book *My Nature Notebook* with a partner
- Observing their own sample study sites to learn about the diversity of plants in a habitat
- Analyzing maps of the tiger reserve from 1995 and 2015, and discovering that no new chalta trees have grown during that time, but other plants have
- Recording measurements of seeds planted in various conditions
- Co-constructing an explanation for why the chalta seeds must not be getting the sunlight and water they need

KEY


HANDS-ON


MODELING


READING


STUDENT-TO-STUDENT DISCUSSION


TEACHER-LED DISCUSSION


WRITING

DAY 1 | LESSON 1.1

Pre-Unit Assessment

- Introducing the Context of the Unit (10 min)
- Introducing the Reference Book (20 min)
- Diagramming Initial Explanations (30 min)

Pre-Unit Assessment

DAY 2 | LESSON 1.2

My Nature Notebook

- Setting a Purpose for Reading (10 min)
- Partner Reading (25 min)
- Reflecting on Ways to Study a Habitat (20 min)

On-the-Fly Assessment

DAY 3 | LESSON 1.3

Investigating Habitats

- Preparing to Investigate a Habitat (15 min)
- Investigating a Sample Study Site (30 min)
- The Sample Study Site in the Bengal Tiger Reserve (15 min)

Optional Flextension: *Investigating Sample Study Sites*

DAY 4 | LESSON 1.4

Discovering the Problem in the Reserve

- Counting Trees in the Sample Study Site (20 min)
- Discussing the Data from the Sample Study Site (10 min)
- Reading About the Broadleaf Forest (15 min)
- Investigating Different Habitats (15 min)

On-the-Fly Assessment

DAY 5 | LESSON 1.5

What Are Seeds?

- New Trees in the Bengal Tiger Reserve (10 min)
- Observing Seeds (25 min)
- Reading About Seeds (15 min)
- Sequencing Plant Growth (10 min)

On-the-Fly Assessment

DAY 6 | LESSON 1.6

Investigating Seed Needs

- Preparing for Seed Investigations (15 min)
- Water Investigation (15 min)
- Sunlight Investigation (15 min)
- Measuring and Reflecting on Plant Growth (15 min)

On-the-Fly Assessment

DAY 7 | LESSON 1.7

Explaining Why There Are No New Chalta Trees

- Revisiting the Bengal Tiger Reserve (15 min)
- Introduction to Concept Mapping (25 min)
- Writing a Scientific Explanation (20 min)

Critical Juncture Assessment
Self-Assessment

Chapter 2:
The storyline builds

What students investigate:

Why aren't the chalta seeds getting the sunlight and water they need to grow?

What they figure out:

The chalta trees in the tiger reserve use their roots to get water from the soil and their leaves to get sunlight. Growing chalta seeds need space far enough away from other plants so their roots can spread and their leaves can get sunlight. The chalta seeds must not be getting to places where they can get what they need to grow.

How they figure it out:

- Investigating roots and leaves from different plants, and exploring how the different structures of a plant work together to help the plant grow as they read the student book *A Plant Is a System* with a partner
- Playing a board game
- Discovering that plants need to be in a place where they have space for their roots to absorb water and where the sun is not blocked by other plants' leaves by using the Modeling Tool
- Co-creating a written explanation about why the chalta seeds are not getting to places where they can grow

KEY


HANDS-ON


MODELING


READING


STUDENT-TO-STUDENT DISCUSSION


TEACHER-LED DISCUSSION


WRITING

DAY 8 | LESSON 2.1

Exploring Plant Parts

- How Do Plants Get Water and Sunlight? (5 min)
- Exploring Roots and Leaves (15 min)
- Measuring Roots and Leaves (25 min)
- Debriefing Plant Parts (15 min)

On-the-Fly Assessment

DAY 9 | LESSON 2.2

A Plant Is a System

- Setting a Purpose for Reading (5 min)
- Partner Reading (30 min)
- Concept Mapping Routine (20 min)
- Reflecting on Plant Parts (5 min)

On-the-Fly Assessment

DAY 10 | LESSON 2.3

Investigating How Roots and Leaves Grow

- Writing About Roots and Leaves (20 min)
- Playing the Growing Roots Game (20 min)
- Modeling Sunlight on Leaves (20 min)

On-the-Fly Assessment

DAY 11 | LESSON 2.4

Finding a Good Place to Grow

- Exploring a Good Place to Grow (15 min)
- A Good Place to Grow in the Desert (25 min)
- Recording a Good Place to Grow (15 min)
- A Good Place to Grow in the Reserve (10 min)

Critical Juncture Assessment

DAY 12 | LESSON 2.5

Why Aren't New Chalta Trees Growing?

- Revisiting the Bengal Tiger Reserve (15 min)
- A Good Place to Grow in the Everglades (15 min)
- Writing a Scientific Explanation (30 min)

Critical Juncture Assessment
Self-Assessment

Chapter 3:
The storyline goes deeper

What students investigate:

Why aren't the chalta seeds getting to places where they can grow?

What they figure out:

The chalta trees in the Bengal Tiger Reserve depend on elephants to disperse their seeds. Elephants eat the chalta fruit for food, move to other places in the habitat, and leave droppings with seeds inside in locations that might have water and sunlight. A fence built in 1996 has prevented elephants from coming inside the reserve, so elephants could no longer disperse chalta seeds to places where they might grow.

How they figure it out:

- Simulating animal dispersal of seeds, measuring how many seeds were dispersed to places where the seeds are likely to grow, and analyzing their results using the Modeling Tool
- Learning about John Harte, a scientist who investigates plants and animals in the places where they live as they read *Habitat Scientist* with a partner
- Obtaining information about how the different parts of the Bengal Tiger Reserve habitat interact
- Creating diagrams that show the interdependence of plants and animals
- Explaining how seeds in particular habitats get dispersed by using the Modeling Tool
- Revising their written explanation about why the chalta seeds are not getting to places where they can grow

KEY


HANDS-ON


MODELING


READING


STUDENT-TO-STUDENT DISCUSSION


TEACHER-LED DISCUSSION


WRITING

DAY 13 | LESSON 3.1

Habitat Scientist

- Think-Draw-Pair-Share Routine (15 min)
- Setting a Purpose for Reading (10 min)
- Partner Reading (30 min)
- Hiding Seeds Model (5 min)

On-the-Fly Assessment

DAY 14 | LESSON 3.2

Investigating How Seeds Move

- Introducing the Dispersing Seeds Model, Part 1 (5 min)
- Parts of the Dispersing Seeds Model (10 min)
- Dispersing Seeds Model, Part 1 (30 min)
- Debriefing the Dispersing Seeds Model, Part 1 (15 min)

DAY 15 | LESSON 3.3

Investigating Seed Dispersal

- Introducing the Dispersing Seeds Model, Part 2 (5 min)
- Dispersing Seeds Model, Part 2 (20 min)
- Counting Droppings and Seeds (25 min)
- Reflecting on the Habitat Model (10 min)

On-the-Fly Assessment

DAY 16 | LESSON 3.4

Diagramming a System

- Diagramming a Habitat (20 min)
- Parts of the Broadleaf Forest Habitat (15 min)
- Diagramming the Broadleaf Forest (15 min)
- Discussing Interdependence in the Broadleaf Forest Habitat (10 min)

On-the-Fly Assessment

DAY 17 | LESSON 3.5

Plant and Animal Interdependence

- Returning to the Hiding Seeds Model (10 min)
- Seed Dispersal in a City Park (10 min)
- Seed Dispersal in Different Habitats (25 min)
- Reflecting on Seed Dispersal (15 min)

On-the-Fly Assessment

DAY 18 | LESSON 3.6

Explaining the Problem in the Reserve

- Revisiting the Bengal Tiger Reserve (15 min)
- Concept Mapping Routine (15 min)
- Writing a Scientific Explanation (30 min)

Critical Juncture Assessment
Self-Assessment

Chapter 4: Application to a new context

What students investigate:

How are other seeds in the reserve able to get to places where they can grow?

What they figure out:

Other seeds from plants in the Bengal Tiger Reserve can get to places where they can grow because the wind disperses them. For example, the wind picks up the sal tree seeds and red silk tree seeds and carries them to different places.

How they figure it out:

- Learning about how peers designed and carried out an investigation about seed dispersal for seeds without fleshy fruits as they participate in a whole-class reading and then partner reading of the student book *Investigating Seeds*
- Observing images of seeds and predicting how the seeds' structures might help them be dispersed to new places
- Planning an investigation of seeds with specific structures
- Carrying out investigations of two different wind-dispersed seeds by counting and measuring the distance the seeds traveled in the wind
- Co-creating a written explanation about how other seeds in the Bengal Tiger Reserve are dispersed

KEY


HANDS-ON


MODELING


READING


STUDENT-TO-STUDENT DISCUSSION


TEACHER-LED DISCUSSION


WRITING

DAY 19 | LESSON 4.1

Investigating Seeds

- Revisiting Seed Dispersal (5 min)
- Think-Draw-Pair-Share Routine (10 min)
- Whole-Class Reading (15 min)
- Partner Reading (30 min)

On-the-Fly Assessment

DAY 20 | LESSON 4.2

Planning the Seed Investigations

- Introducing the Seed Investigations (15 min)
- Measurement in *Investigating Seeds* (20 min)
- Planning the Propeller Seed Investigation (10 min)
- Planning the Fluffy Seed Investigation (15 min)

On-the-Fly Assessment

DAY 21 | LESSON 4.3

Conducting the Seed Investigations

- Propeller Seed Investigation Setup (10 min)
- Propeller Seed Investigation (10 min)
- Fluffy Seed Investigation (25 min)
- Explaining Wind Dispersal (15 min)

On-the-Fly Assessment

DAY 22 | LESSON 4.4

End-of-Unit Assessment

- Categorizing Seed Dispersal (20 min)
- Reflecting on Dispersal Methods (5 min)
- Habitat Explanations (30 min)
- Concluding the Unit (5 min)

End-of-Unit Assessment
Self-Assessment

All students. All standards.

Rather than treating the standards simply as a list of topics to cover, we designed Amplify Science California to allow for truly in-depth and integrated coverage of the disciplinary core ideas (DCIs), science and engineering practices (SEPs), and crosscutting concepts (CCCs). Unlike other programs, however, ours makes the NGSS' vision of "all students, all standards" a reality by creating a unit-specific learning progression for every unit called a Progress Build.

Each Progress Build defines several levels of understanding of the unit's anchoring phenomenon, with each level integrating and building upon the knowledge and skills from lower levels. In this way, each Progress Build provides a clear roadmap for how students' understanding of the phenomenon is expected to deepen and develop with each successive chapter and lesson.

What's more, the program's system of assessments is also tied to these Progress Builds. This carefully crafted integration provides teachers with credible, actionable, and timely diagnostic information about student progress toward the unit's learning goals and grade-level performance expectations. Armed with this powerful data, teachers have the ultimate flexibility to decide when to move on and when to slow down and dive deeper.

Plant and Animal Relationships Progress Build

The Progress Build in this unit consists of three levels of understanding. At each level, students add new ideas and integrate them into a progressively deeper understanding of the interdependence of plants and animals in a habitat and how a plant's seeds can be moved to new places in a habitat.

Progress Build Level 1:

Plants make seeds, which can sprout and grow into new plants only if they get enough sunlight and water.

Progress Build Level 2:

In order to grow, seeds need space to get sunlight on their leaves and to spread their roots to get water.

Progress Build Level 3:

Some plants depend on animals to disperse their seeds, and some animals depend on these plants for food.

Examples of differentiation in this unit

In addition to providing unit-specific Progress Builds that break learning goals into smaller, more achievable levels of understanding, Amplify Science California makes learning accessible for all students through a variety of scaffolds, supports, and differentiation strategies for every lesson. **For a complete list of strategies, see the Differentiation section of every Lesson Brief**.

Below are a few examples of strategies embedded in this unit.

For English learners:

Alternate means of expressing ideas (Example from Lesson 3.5)
In Activity 3, students write about how plants and animals in a habitat depend on each other. It may be appropriate for some students to express their understanding of this idea by using labeled drawings or diagrams rather than or in addition to written responses. Students might also provide their responses orally (with your assistance to record the ideas), if appropriate. Allow English learners, particularly those at the Emerging level of English language proficiency, to discuss the prompts with a partner using their primary language.

For students needing more support:

Provide visual cues (Example from Lesson 4.2)
You may decide to allow students to start by sorting the cards any way they would like. Encourage them to talk about the choices they made during their sort. By doing this before the card-sort activities in the lesson, students should be better able to focus on the task at hand.

For students ready for a challenge:

Critique the model (Example from Lesson 2.3)
Invite students to compare the Sunlight and Leaves Model to the Multiple Plants Body Model. Have students write about the similarities and differences between the two representations of potential constraints on seed and plant growth.

3-D Statements

In order to help teachers recognize the three-dimensional structure of every unit, chapter, and lesson, each unit contains a 3-D Statement document that makes the integration clear.

Making the 3-D statement document all the more effective, the three dimensions are color-coded for easy recognition.

Plant and Animal Relationships 3-D Coverage

SEPs
Science and Engineering Practices

DCIs
Disciplinary Core Ideas

CCCs
Cross-Cutting Concepts

Unit Level

As plant scientists, students use and create models to investigate and then plan and carry out investigations to explain why new chalta trees are not growing in a section of a broadleaf forest in India (systems and systems models; scale, proportion, and quantity). In so doing, they figure out how the parts of a habitat system interact generally and about seed dispersal mechanisms specifically (systems and systems models, structure and function).

Chapter Level

Chapter 1: Why aren't new chalta trees growing in the Bengal Tiger Reserve?

Students investigate and analyze data about the relationship between seeds, sunlight, and water (systems and system models; scale, proportion, and quantity) in order to gather evidence to explain why new chalta trees are not growing in the Bengal Tiger Reserve (systems and system models; scale, proportion, and quantity).

Chapter 2: Why aren't the chalta seeds getting what they need to grow?

Students obtain information about the role of different plant parts within the system of a plant in order to explain why new chalta trees are not getting what they need to grow in the Bengal Tiger Reserve (systems and system models, structure and function). Students also use and create models to figure out that seeds need space to spread their roots and leaves (systems and system models; scale, proportion, and quantity).

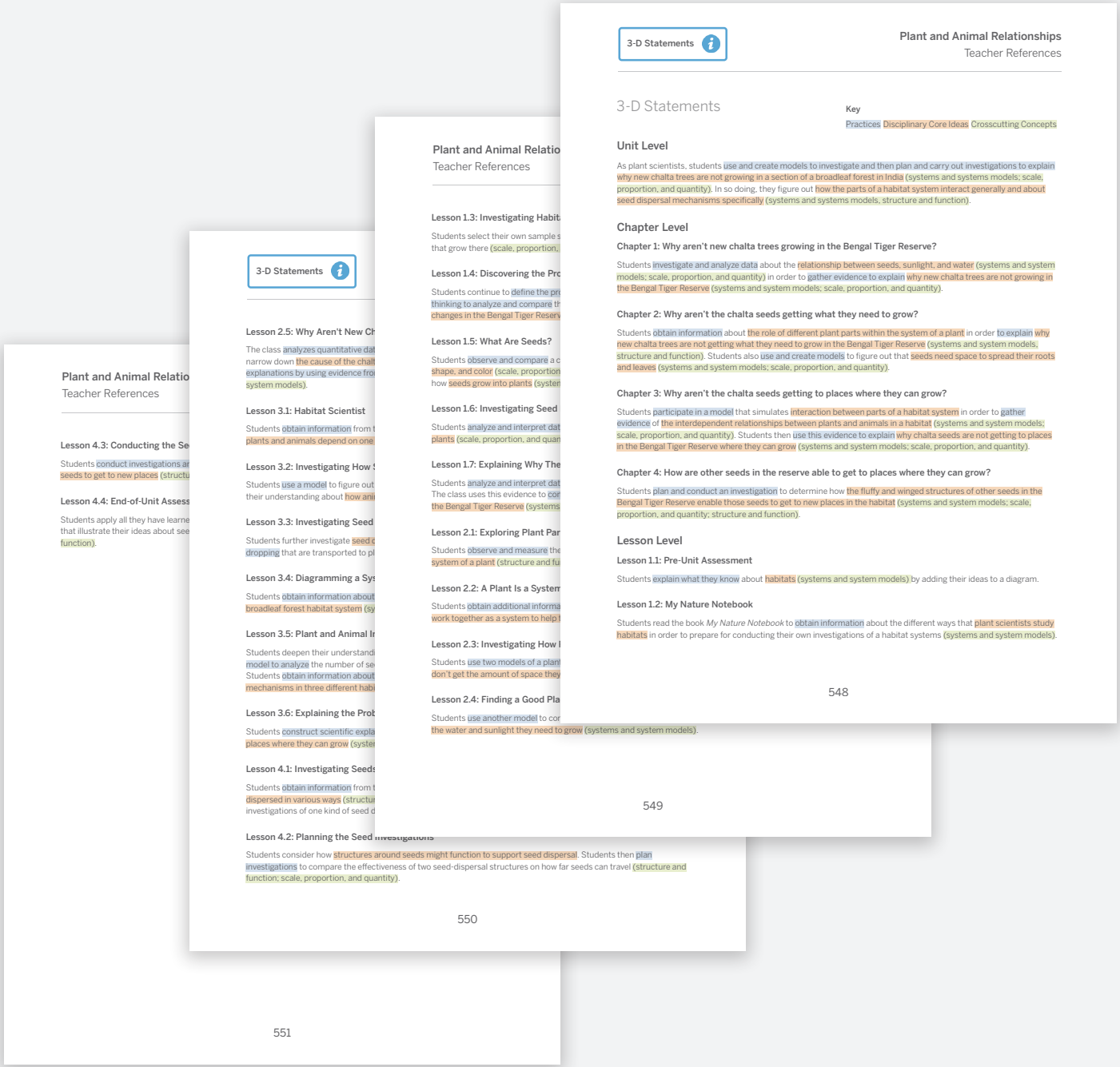
Chapter 3: Why aren't the chalta seeds getting to places where they can grow?

Students participate in a model that simulates interaction between parts of a habitat system in order to gather evidence of the interdependent relationships between plants and animals in a habitat (systems and system models; scale, proportion, and quantity). Students then use this evidence to explain why chalta seeds are not getting to places in the Bengal Tiger Reserve where they can grow (systems and system models; scale, proportion, and quantity).

Chapter 4: How are other seeds in the reserve able to get to places where they can grow?

Students plan and conduct an investigation to determine how the fluffy and winged structures of other seeds in the Bengal Tiger Reserve enable those seeds to get to new places in the habitat (systems and system models; scale, proportion, and quantity; structure and function).

To review the 3-D Statements at the lesson level, see the Lesson Brief section of every lesson.



3-D Statements

Plant and Animal Relationships
Teacher References

3-D Statements

Key
Practices Disciplinary Core Ideas Crosscutting Concepts

Unit Level

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Chapter 3: Why aren't the chalta seeds getting to places where they can grow?

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Chapter 4: How are other seeds in the reserve able to get to places where they can grow?

Students plan and conduct an investigation to determine how the fluffy and winged structures of other seeds in the Bengal Tiger Reserve enable those seeds to get to new places in the habitat (systems and system models; scale, proportion, and quantity; structure and function).

Lesson Level

Lesson 1.1: Pre-Unit Assessment

Students explain what they know about habitats (systems and system models) by adding their ideas to a diagram.

Lesson 1.2: My Nature Notebook

Students read the book *My Nature Notebook* to obtain information about the different ways that plant scientists study habitats in order to prepare for conducting their own investigations of a habitat systems (systems and system models).

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Plant and Animal Relationships
Teacher References

Lesson 1.3: Investigating Habit

Students select their own sample s
that grow there (scale, proportion,

Lesson 1.4: Discovering the Pro

Students continue to define the pr
thinking to analyze and compare th
changes in the Bengal Tiger Reserv

Lesson 1.5: What Are Seeds?

Students observe and compare a c
shape, and color (scale, proportion
how seeds grow into plants (systen

Lesson 1.6: Investigating Seed

Students analyze and interpret dat
plants (scale, proportion, and quan

Lesson 1.7: Explaining Why The

Students analyze and interpret dat
The class uses this evidence to cor
the Bengal Tiger Reserve (systems

Lesson 2.1: Exploring Plant Par

Students observe and measure the
system of a plant (structure and fu

Lesson 2.2: A Plant Is a System

Students obtain additional informa
work together as a system to help t

Lesson 2.3: Investigating How I

Students use two models of a plant
don't get the amount of space they

Lesson 2.4: Finding a Good Pla

Students use another model to cor
the water and sunlight they need to grow (systems and system models).

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3-D Statements

Lesson 2.5: Why Aren't New Ch

The class analyzes quantitative dat
narrow down the cause of the chalt
explanations by using evidence fro
system models).

Lesson 3.1: Habitat Scientist

Students obtain information from t
plants and animals depend on one

Lesson 3.2: Investigating How S

Students use a model to figure out
their understanding about how ani

Lesson 3.3: Investigating Seed

Students further investigate seed d
dropping that are transported to pl

Lesson 3.4: Diagramming a Sys

Students obtain information about
broadleaf forest habitat system (sy

Lesson 3.5: Plant and Animal In

Students deepen their understandi
model to analyze the number of se
Students obtain information about
mechanisms in three different habi

Lesson 3.6: Explaining the Prob

Students construct scientific expla
places where they can grow (syste

Lesson 4.1: Investigating Seeds

Students obtain information from t
dispersed in various ways (structur
investigations of one kind of seed d

Lesson 4.2: Planning the Seed Investigations

Students consider how structures around seeds might function to support seed dispersal. Students then plan investigations to compare the effectiveness of two seed-dispersal structures on how far seeds can travel (structure and function; scale, proportion, and quantity).

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Plant and Animal Relationships
Teacher References

Lesson 4.3: Conducting the Se

Students conduct investigations ar
seeds to get to new places (structu

Lesson 4.4: End-of-Unit Assess

Students apply all they have learne
that illustrate their ideas about see
function).

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Notes

Notes

For more information on Amplify Science, visit **amplify.com/science/california**.

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